1 Introduction

The nation's aquatic resources are among its most valuable assets. Although environmental protection programs in the United States have successfully improved water quality during the past 30 years, many challenges remain. Significant strides have been made in reducing the impacts of discrete pollutant sources, but aquatic ecosystems remain impaired, primarily because of complex pollution problems caused by nonpoint source (NPS) pollution.

The most recent national water quality inventory (1998) shows that of waters surveyed nearly 35 percent of rivers and streams, 45 percent of lakes, reservoirs, and ponds, and 44 percent of estuaries in the United States remain too polluted for fishing, swimming, and other uses. Many pollutants are delivered to these surface waters and to groundwater from diffuse sources, such as urban runoff, agricultural runoff, and atmospheric deposition of contaminants. The leading causes of impairment are nutrients, pathogens, siltation, oxygen-depleting substances, metals, and suspended solids (USEPA, 2000a). Habitat alterations, such as hydromodification, dredging, streambank destabilization, and the loss or degradation of wetlands, also degrade water quality.

Wetlands and riparian areas have been determined to play a significant role in managing the adverse water quality impacts associated with NPS pollution, and they help decrease the need for costly storm water and flood protection facilities. In addition, in their natural condition they provide habitat for feeding, nesting, cover, and breeding to many species of birds, fishes, amphibians, reptiles, and mammals.

Wetlands and riparian areas play a significant role in managing the adverse water quality impacts associated with NPS pollution.

1.1 What Are The Purpose and Scope of This Guidance?

It is important to recognize that a tension exists between protecting wetlands for their natural pollutant reduction capabilities and using wetlands to clean storm water or wastewater. Robb (1992) recognized that tension as follows:

> *Wetlands have an important role in the landscape through their ability to improve water quality by filtering, transforming, and accumulating pollutants and thereby protecting adjacent rivers, lakes, and streams. This "buffering" function, however, also encourages overuse, and this overuse can compromise these and other wetland functions, such as wildlife habitat and aesthetic and recreational values.*

According to Fields (1992), wetlands should be preserved for their pollutant abatement abilities while maintaining overall wetland health.

> *Foremost, wetlands should be protected because of the many values and functions they provide. But, in addition, protection and restoration of wetlands are also acceptable management measures for preventing the impacts to water*
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> *quality that result when wetlands are destroyed or degraded... The benefit of improved water quality will be realized if wetlands and riparian areas are maintained (or restored) in the landscape to perform their natural functions. When this approach is used, additional BMPs [best management practices], such as buffer zones, must be utilized to ensure that there is no adverse impact to wildlife using the wetlands and that the integrity of the wetlands will be maintained over time.*

This guidance document describes the best available, most economically achievable means of reducing NPS pollution of surface waters and groundwater through the protection and restoration of wetlands and riparian areas, as well as the implementation of vegetated treatment systems. The guidance provides background information about NPS pollution, including where it comes from and how it enters the nation's waters; discusses the broad concept of assessing and addressing water quality problems on a watershed level; and presents recent technical information about how certain types of NPS pollution can be reduced effectively through the implementation of these management measures.

Although the scope of this guidance is broad and includes many diverse wetland and riparian area NPS topics, a number of issues are not covered. Such issues include treatment wetlands for abandoned mine drainage and wastewater treatment wetlands. Application of constructed wetlands as an alternative to conventional engineering methods for the treatment of mine drainage and wastewater is gaining recognition as a reliable and economical method for improving water quality. Information on this technology is growing at exponential rates. Readers interested in these topics are referred to Kadlec and Knight (1996), Moshiri (1993), and or a local Natural Resources Conservation Service (NRCS) office for information on the planning, design, construction, and operation of treatment wetlands for water quality improvement.

This document provides guidance to states, territories, authorized tribes, and the public regarding management measures that may be used to protect and restore the NPS pollution abatement functions of wetlands and riparian areas. This document refers to statutory and regulatory provisions that contain legally binding requirements. This document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it does not impose legally binding requirements on EPA, states, territories, authorized tribes, or the public and might not apply to a particular situation based upon the circumstances. The decision makers of EPA, states, territories, and authorized tribes retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. EPA may change this guidance in the future.

This guidance is designed to provide current information to state program managers on controlling NPS pollution to wetlands, riparian areas, and vegetated treatment systems.

Readers should note that this guidance is entirely consistent with the *Guidance Specifying Management Measures for Sources of Nonpoint Source Pollution in Coastal Waters* (USEPA, 1993c), published under section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA). The management measures are the same, but this document modifies, expands, and supplements the technical information contained in the coastal management measures guidance to ensure that it reflects particular circumstances relevant to differing inland conditions and provides up-to-date technical information.

In one way, this guidance contrasts with the CZARA management measures guidance: State coastal nonpoint pollution control programs are required to be in conformity with the management measures set forth in that document. The guidance provided in this document, on the other hand, is intended merely to provide technical assistance to state program managers and others seeking updated information on the best available, economically achievable means to address NPS pollution. This guidance accomplishes that objective by expanding and enhancing the descriptions and examples first presented in the CZARA guidance. This document does not set new or additional standards for either CZARA section 6217 Coastal Nonpoint Pollution Control Programs or Clean Water Act section 319 Nonpoint Source Management Programs.

*This guidance does **not** replace the 1993* Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.

1.2 What Is in This Document?

This document contains six chapters and six appendices, which are described below.

Chapter 1: Introduction

Chapter 1 provides a brief introduction to NPS pollution and the national effort to control it. It also provides background information on the 1993 *Guidance Specifying Management Measures for Sources of Nonpoint Source Pollution in Coastal Waters*, a predecessor to this document.

Chapter 2: Overview

Chapter 2 introduces wetlands, riparian areas, and vegetated treatment systems. It explains what they are, how they function, and what their importance is in terms of NPS pollution.

Chapter 3: Management Measures

Chapter 3 briefly defines what management measures are and how they work to prevent NPS pollution. It also describes management practices.

Chapter 4: Protection of Wetlands and Riparian Areas

Chapter 4 contains information on the management measure for the protection of wetlands and riparian areas and its four practices. It also has a list of resources for further information.

Chapter 5: Restoration of Wetlands and Riparian Areas

Chapter 5 explains what restoration is and discusses the management measure for restoration of wetlands and riparian areas. Three practices to implement the management measure are discussed.

Chapter 6: Vegetated Treatment Systems

Chapter 6 describes the management measure and three practices related to vegetated treatment systems.

Resources

A list of resources for further information on topics discussed in this document is provided.

Glossary

The glossary defines important terminology used throughout this document.

References

The references used in this document are provided in one combined section.

Appendix A: Examples of Federal, Nonprofit, and Private Financial and Technical Assistance Programs

Appendix A contains information on federal incentive programs to protect and restore wetlands. It also contains incentive programs from nonprofit and private organizations. For each agency and organization, contacts are provided for further information.

Appendix B: U.S. Environmental Protection Agency Contacts

Appendix B provides wetland contacts, NPS regional contacts, and Clean Water State Revolving Fund contacts.

Appendix C: U.S. Army Corps of Engineers Wetland Contacts

Appendix C provides information on Division Regulatory Offices and District Regulatory Offices for the U.S. Army Corps of Engineers.

Appendix D: U.S. Fish and Wildlife Service Regional Wetland Contacts

Appendix D lists regional wetland contacts.

Appendix E: U.S. State and Territory Agency Wetland Contacts

Appendix E provides wetland contact names for each state and trust territory.

Appendix F: Case Studies Organized by State, Territory, and Tribe

Appendix F is directly related to the tables provided in the chapters. It provides more detailed information on implementation activities, case studies, and resource documents. In Chapters 4 through 6, appropriate implementation practices are described for each management measure. Within the discussion of each implementation practice is a table entitled “Map Box.” The map box contains a

list of appropriate activities that can be used to implement that practice. Each implementation activity is followed by a list of titles and locations, e.g., "Local Wetland Management Plans (AK)." (refer to Table 1-1.) These titles indicate a specific case study representative of that implementation activity. By using the location indicator, in this case AK for Alaska, the reader knows to turn to Appendix F, find the section on Alaska, and look for the case study entitled "Local Wetland Management Plans." It is there that the reader can find more information about the case study, including the source of information. At the top of each map box, an outline of the United States indicates that there are case studies for this practice from those states that are shaded.

1.3 What Is Nonpoint Source Pollution?

Nonpoint source pollution generally results from precipitation, atmospheric deposition, land runoff, infiltration, drainage, seepage, or hydrologic modification. As runoff from rainfall or snowmelt moves, it picks up and transports natural pollutants and pollutants resulting from human activity, ultimately depositing them into rivers, lakes, wetlands, and coastal waters or, through percolation, into the groundwater. In a legal sense, the term *nonpoint source* is defined to mean any source of water pollution that does not meet the legal definition of *point source* in section 502(14) of the Clean Water Act, as amended by the Water Quality Act of 1987.

> *The term* **point source** *means any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.*

Although diffuse runoff is usually treated as NPS pollution, runoff that enters and is discharged from conveyances such as those described above is treated as a point source discharge and therefore is subject to the permit requirements of the Clean Water Act. In contrast, nonpoint sources are not subject to federal permit requirements. Point sources typically enter receiving surface water bodies at some identifiable site(s) and carry pollutants whose generation is controlled by some internal process or activity, rather than by the weather. Point source discharges such as municipal and industrial wastewaters, runoff or leachate from solid waste disposal sites and concentrated animal feeding operations, and storm sewer outfalls from large urban centers are regulated and permitted under the Clean Water Act.

Although it is imperative that water program managers understand and manage in accordance with legal definitions and requirements, the nonlegal community often characterizes nonpoint sources in the following ways:

- NPS discharges enter surface waters or groundwater in a diffuse manner at intermittent intervals related mostly to meteorological events.

- Pollutant generation arises over an extensive land area, and pollutants move overland before they reach surface waters or infiltrate into the groundwater.
- The extent of NPS pollution is related to uncontrollable climatic events and to geographic and geologic conditions, and it varies greatly from place to place and from year to year.
- Nonpoint sources are often more difficult or expensive to monitor, as compared to point sources.
- Abatement of NPS pollution is focused on land and runoff management practices, rather than on effluent treatment.
- Emissions cannot be measured in terms of effluent limitations.

The NPS pollutants that cause the greatest impacts are suspended solids, nutrients, toxic substances, organic matter, and pathogens. Hydrologic modification can also cause adverse effects on the biological and physical integrity of surface waters and groundwater.

1.4 What National Efforts Are Under Way to Control Nonpoint Source Pollution?

1.4.1 Nonpoint Source Program (Clean Water Act Section 319)

During the first 15 years of the national program to abate and control water pollution (1972-1987), EPA and its partners focused most of their water pollution control activities on traditional point sources like discharges through pipes from sewage treatment plants and industrial facilities. These point sources have been regulated by EPA and the states through the National Pollutant Discharge Elimination System (NPDES) permit program established by section 402 of the 1972 Federal Water Pollution Control Act (Clean Water Act). Discharges of dredged and fill materials into wetlands have been regulated by the U.S. Army Corps of Engineers and EPA under section 404 of the Clean Water Act.

Section 319 requires states to assess NPS pollution and implement management programs.

As a result of the activities mentioned previously, the nation has greatly reduced pollutant loads from point source discharges and has made considerable progress in restoring and maintaining water quality. However, the gains in controlling point sources have not solved all of the nation's water quality problems. Recent studies and surveys conducted by EPA and by state and tribal water quality agencies indicate that the majority of the remaining water quality impairments in our nation's rivers, streams, lakes, estuaries, coastal waters, and wetlands result from NPS pollution and other nontraditional sources, such as urban storm water discharges and combined sewer overflows.

In 1987, in view of the progress achieved in controlling point sources and the growing national awareness of the increasingly dominant influence of NPS pollution on water quality, Congress amended the Clean Water Act to focus greater national efforts on nonpoint sources. Under this amended version,

referred to as the 1987 Water Quality Act, Congress revised section 101, Declaration of Goals and Policy, to add the following fundamental principle:

> *It is the national policy that programs for the control of NPS pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution.*

More importantly, Congress enacted section 319 of the 1987 Water Quality Act, which established a national program to control nonpoint sources of water pollution. Under section 319, states and tribes assess NPS pollution problems and causes within the state and implement management programs to control the NPS pollution. Section 319 authorizes EPA to issue grants to states to assist them in implementing management programs or portions of management programs that have been approved by EPA.

Section 319 authorizes EPA to provide grants to assist state and tribal NPS pollution control programs.

1.4.2 National Estuary Program

EPA also administers the National Estuary Program under section 320 of the Clean Water Act. This program focuses on both point and nonpoint sources of pollution in designated geographically targeted, high-priority estuarine waters. Through this program, EPA assists state, regional, and local governments in developing comprehensive conservation and management plans that recommend priority corrective actions to restore estuarine water quality, fish populations, and other designated uses of the waters.

1.4.3 Pesticides Program

Another program administered by EPA that controls some forms of NPS pollution is the pesticides program under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Among its provisions, the program authorizes EPA to control pesticides that might threaten groundwater and surface waters. FIFRA provides for the registration of pesticides and enforceable label requirements, which may include maximum rates of application, restrictions on use practices, and classification of pesticides as "restricted use" pesticides (which restricts use to certified applicators trained to handle toxic chemicals).

1.4.4 Farm Bill Conservation Provisions

Technical and financial assistance for landowners seeking to preserve soil and other natural resources is authorized by the federal government under provisions of the Food Security Act (Farm Bill). Provisions included in the 1996 Farm Bill relate directly to installation and maintenance of BMPs and are summarized here.

Environmental Conservation Acreage Reserve Program (ECARP). Established by the 1996 Farm Bill, the ECARP is an umbrella program that contains the Conservation Reserve Program (CRP), Wetlands Reserve Program

Many Farm Bill programs provide funds for land treatment. Please contact your state or local U.S. Department of Agriculture (USDA) office for details.

(WRP), and Environmental Quality Incentives Program (EQIP). It authorizes th e Secretary of Agriculture to designate watersheds, multistate areas, or regions of special environmental sensitivity as conservation priority areas, which are eligible for enhanced federal assistance. Assistance in priority areas is to be used to help agricultural producers comply with the NPS pollution requirements of the Clean Water Act and other state and federal environmental laws. The ECARP is authorized through 2002.

- *Conservation Reserve Program.* The CRP is a voluntary program that was first authorized by the Food Security Act of 1985 (Farm Bill). The program offers annual rental payments, incentive payments, and cost-share assistance for establishing long-term, resource-conserving cover crops on highly erodible land. Conservation Reserve Program contracts are issued for a duration of 10 to 15 years for up to 36.4 million acres of cropland and marginal pasture. Land can be accepted into the CRP through a competitive bidding process wherein all offers are ranked using an environmental benefits index, or through continuous sign-up for eligible lands where certain special conservation practices will be implemented.
- *Wetlands Reserve Program.* The WRP is a voluntary program to restore and protect wetlands and associated lands. Participants may sell a permanent or 30-year conservation easement or enter into a 10-year cost-share agreement with the U.S. Department of Agriculture (USDA) to restore and protect wetlands. The landowner voluntarily limits future use of the land, yet retains private ownership. The Natural Resources Conservation Service (NRCS) provides technical assistance in developing a plan for restoration and maintenance of the land. The landowner retains the right to control access to the land and may lease the land for hunting, fishing, and other outdoor recreational activities.
- *Environmental Quality Incentives Program.* EQIP was established by the 1996 Farm Bill to provide a voluntary conservation program for farmers and ranchers to address serious threats to soil, water, and related natural resources. EQIP offers financial, technical, and educational help to install or implement structural, vegetative, and management practices designed to conserve soil and other natural resources. The Farm Bill requires that one-half of the available monies be directed to livestock-related concerns. Cost-sharing may pay up to 75 percent of the costs for certain conservation practices. Incentive payments may be made to encourage producers to implement land management practices such as nutrient management, manure management, integrated pest management, irrigation water management, and wildlife habitat management. Cost-share for construction of animal waste management facilities is prohibited for livestock operations of more than 1,000 animal units unless otherwise approved by the Chief of NRCS. However, these operations are eligible for incentive payments and technical and educational assistance.

Wildlife Habitat Incentives Program (WHIP). WHIP is designed for landowners who want to develop and improve wildlife habitat on private lands. Plans are developed in consultation with the NRCS and the local Conservation District.

USDA provides technical assistance and cost-share for up to 75 percent of the cost of installing the wildlife habitat improvement practices. Participants typically must sign a 5- to 10-year contract with USDA that requires that they maintain the practices.

Forestry Incentives Program (FIP). Originally authorized in 1978, the FIP allows cost-sharing of up to 75 percent (up to a maximum of $10,000 per person per year) for tree planting, timber stand improvement, and related practices on nonindustrial private forestland. The NRCS and the U.S. Forest Service administer the FIP. Cost-share funds are restricted, in most cases, to individuals that own no more than 1,000 acres of eligible land.

Conservation of Private Grazing Land. This program was authorized by the 1996 Farm Bill for the purpose of providing technical and educational assistance to owners of private grazing lands. It offers opportunities for better land management, erosion reduction, water conservation, wildlife habitat, and improving soil structure.

Swampbuster Program. Through the Wetland Conservation (Swampbuster) provision of the 1985 and 1990 farm bills, all agricultural producers are required to protect the wetlands on the farms they own or operate if they want to be eligible for USDA farm program benefits. Under Swampbuster, a producer who converts a wetland so that agricultural production is possible loses access to specified farm program benefits until the wetland is restored. The NRCS determines compliance with Swampbuster and assists farmers in the identification of wetlands and in the development of wetland protection, restoration, and creation plans.

Conservation of Highly Erodible Lands. The highly erodible land part of the 1985 Food Security Act restricts access by agricultural producers who grow crops on highly erodible land to specified farm program benefits. The goals are to reduce soil lost to wind and water erosion and to improve water quality. Compliance requires the development of a conservation plan for all highly erodible fields on a farm. The plans must be approved by the producer, NRCS, and the local Natural Resources District. NRCS provides technical assistance to the producer in developing the plan.

1.4.5 Coastal Nonpoint Pollution Control Program

In November 1990 Congress enacted the Coastal Zone Act Reauthorization Amendments (CZARA). These amendments were intended to address several concerns, including the impact of NPS pollution on coastal waters.

To more specifically address the impacts of NPS pollution on coastal water quality, Congress enacted section 6217 of CZARA, Protecting Coastal Waters (codified as 16 U.S.C. section 1455b). Section 6217 provides that each state with an approved Coastal Zone Management Program must develop and submit to EPA and the National Oceanic and Atmospheric Administration (NOAA) for approval a Coastal Nonpoint Pollution Control Program. The purpose of the program is "to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters, working in close conjunction with other state and local authorities."

Coastal Nonpoint Pollution Control Programs are not intended to supplant existing coastal zone management programs and NPS management programs. Rather, they are intended to serve as an update and expansion of existing NPS management programs and are to be coordinated closely with the coastal zone management programs that states and territories are already implementing pursuant to the Coastal Zone Management Act of 1972. The legislative history indicates that the central purpose of section 6217 is to strengthen the links between federal and state coastal zone management and water quality programs and to enhance state and local efforts to manage land use activities that degrade coastal waters and habitats. The intent of the legislation was for state coastal zone and water quality agencies to have balanced roles, analogous to the sharing of responsibility between NOAA and EPA at the federal level.

Section 6217(g) of CZARA requires EPA to publish, in consultation with NOAA, the U.S. Fish and Wildlife Service, and other federal agencies, "guidance for specifying management measures for sources of nonpoint pollution in coastal waters." *Management measures* are defined in section 6217(g)(5) as:

> *Economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint source control practices, technologies, processes, siting criteria, operating methods, or other alternatives.*

In 1993 EPA published *Guidance Specifying Management Measures for Sources of Nonpoint Source Pollution in Coastal Waters* (USEPA, 1993c). In the 1993 document, management measures for urban areas; agricultural sources; forestry; marinas and recreational boating; hydromodification (channelization and channel modification, dams, and streambank and shoreline erosion); and wetlands, riparian areas, and vegetated treatment systems were defined and described. The management measures included in this present document for controlling NPS pollution in wetlands, riparian areas, and vegetated treated systems are based on those outlined in the 1993 CZARA guidance.

Table 1-1 Representative Map Box

Implementation Activities Use a landscape approach to evaluate wetland water quality functions. **Example Projects** Local Wetland Management Plans (AK), Wetland Protection (FL)
Implementation Activities Use watershed analysis as a tool to ensure functional performance. **Example Projects** Synoptic Assessment Approach (WA)